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(54) **MULTI-CARRIER TRANSMISSION SYSTEM  
UTILIZING CHANNELS OF DIFFERENT  
BANDWIDTH**

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#### Related U.S. Application Data

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(51) Int. Cl.<sup>7</sup> ..... **H04K 1/10; H04B 1/38; H03D 1/24**

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(57) **ABSTRACT**

A communication system for sending a sequence of symbols on a communication link. The system includes a transmitter for placing information indicative of the sequence of symbols on the communication link and a receiver for receiving the information placed on the communication link by the transmitter. The transmitter includes a clock for defining successive frames, each of the frames including M time intervals, where M is an integer greater than 1. A modulator modulates each of M carrier signals with a signal related to the value of one of the symbols thereby generating a modulated carrier signal corresponding to each of the carrier signals. The modulated carriers are combined into a sum signal which is transmitted on the communication link. The carrier signals include first and second carriers, the first carrier having a different bandwidth than the second carrier. In one embodiment, the modulator includes a tree-structured array of filter banks having M leaf nodes, each of the values related to the symbols forming an input to a corresponding one of the leaf nodes. Each of the nodes includes one of the filter banks. Similarly, the receiver can be constructed of a tree-structured array of sub-band filter banks for converting M time-domain samples received on the communication link to M symbol values.

4 Claims, 5 Drawing Sheets

